rarely connate their entire length forming a staminal tube and free from the petals, the anthers versatile; ovary basically 5-celled, occasionally 4-celled, rarely 6–10-celled, sericeous, the ovules 4 or more in each cell; the styles usually 5, occasionally 3 or 6, rarely 1 or absent, the stigmas usually the same in number as the styles, 5 when the style is solitary or lacking. Fruit an elongate, more or less woody loculicidal capsule with persistent columella; seeds flat or compressed, drawn out into an oblong, membranaceous wing.

TYPE SPECIES: *Laplacea speciosa* HBK.

KEY TO THE SPECIES AND VARIETIES

A. Leaves asymmetrical.
  B. Leaves serrate only along the upper portion of the margin of the extended half of the leaf.
    C. Leaves lightly pubescent to glabrescent on the under surface, not densely sericeous. (South America to Costa Rica) . . . . . .1. *L. fruticosa.*
    . . . . . .1a. *L. fruticosa* var. *pulcherrima.*
    CC. Leaves densely sericeous over the complete under surface of the leaf. (Brazil) . . . . . .1b. *L. fruticosa* var. *sericea.*
  BB. Leaves entire.
    C. Leaves thick-coriaceous measuring up to 10 × 4 cm.; pedicels angled and robust measuring up to 5 cm. long; capsules up to 4 cm. long, 2 cm. diameter. (Colombia) . . . . . .2. *L. robusta.*
    CC. Leaves coriaceous to subcoriaceous; pedicels terete, seldom more than 1 cm. in length; capsules 2–3 cm. long, seldom more than 1–1.5 cm. diameter . . .1c. *L. fruticosa* var. *symplocoides.*
AA. Leaves symmetrical.
  B. Calyx-lobes persistent, very small (ca. 3 mm. long); petals connate at the base forming a tube, with a distinctive coronate-stellate pubescence on the dorsal surface; filaments free from the petals but joined for their entire length, forming a tube. (Mexico to Panama) . . . . . .3. *L. grandis.*
  BB. Calyx-lobes quickly caducous, usually 8–10 mm. long; petals joined only lightly at the extreme base, not tubular, the pubescence when present simple; filaments joined only lightly at the base and adnate to the base of the corolla.
    C. Margin of the leaves entire.
      D. Calyx-lobes pubescent.
        E. Leaves 5–6 cm. long, 2 cm. or more wide. (Ecuador and Venezuela) . . . . . .4. *L. speciosa.*
        EE. Leaves ca. 3 cm. long, 1 cm. wide. (Ecuador) . . . . . .4a. *L. speciosa* var. *intermedia.*
      DD. Calyx-lobes glabrous. (Ecuador and Colombia) . . . . . .4b. *L. speciosa* var. *barbinervis.*
    CC. Margin of the leaves serrulate.
      D. Leaves subcaudate to caudate at the apex (not bluntly acuminate).
        E. Leaves narrow-elliptic, 5–10 cm. long, 2 cm. or less wide. (Minas Geraes, Brazil) . . . . .5. *L. acutifolia.*

EE. Leaves elliptic, 10–15 cm. long, ca. 4 cm. wide. (Peru and Bolivia) ....8a. *L. pubescens* var. *subcaudata.*

DD. Leaves rounded or obtuse at the apex, occasionally bluntly acuminate.

E. Leaves always membranaceous elliptic-spathulate, rounded at the apex, abrupt- and long-tapering at the base. (Peru and Amazonas, Brazil) ....6. *L. spathulata.*

EE. Leaves membranaceous or coriaceous, obovate to lanceolate, tapering at the base, but not abruptly.

F. Leaves membranaceous.

G. Leaves obovate, lightly pubescent to glabrescent on the under surface. (Minas Geraes, Brazil) .....7. *L. obovata.*

GG. Leaves usually lanceolate, occasionally obovate, usually densely pubescent on the under surface, sometimes lightly so. (Colombia, Bolivia and Peru) .....8. *L. pubescens.*

FF. Leaves coriaceous to subcoriaceous.

G. Leaves thick-coriaceous, obovate, with a dense dirty tomentose pubescence on the under surface. (Brazil) ..9. *L. tomentosa.*

GG. Leaves subcoriaceous, obovate to oblanceolate, lightly pubescent on the under surface. (Colombia and Venezuela) ....8b. *L. pubescens* var. *camelliaefolia.*

1. **Laplacea fruticosa** (Schrader) Kobuski in Jour. Arnold Arb. **28:** 437. 1947. — G. J. H. Amshoff, Enum. Herb. Spec. Suriname Wood Coll. made by Prof. G. Stahel 24. 1948. [Reprint: Natuurwetenschappelijke Studiekring voor Suriname en Curaçao," Utrecht No. 2].

Wikstroemia fruticosa Schrader in Götting. Gel. Anzeig. **1821**(71)**:** 711. May 5, 1821; "fructicosa." — Pontin [Editor] in Vet. Akad. Handl. Stockholm **1821:** 168. 1821, obs. in footnote. — Blake in Contrib. Gray Herb. n. s. **53:** 39. 1918.

Lindleya semiserrata Nees in Flora **4**(1)**:** 328. June 7, 1821, nom. nud., as syn.

Laplacea parviflora [Martius in] Spix & Martius, Reise Bras. **1:** 207. 1823, nomen.

Haemocharis semiserrata (Nees) Martius & Zuccarini, Nov. Gen. Sp. **1:** 107, *t. 66.* 1826. — Choisy in Mém. Soc. Phys. Hist. Nat. Genève **1:** 144 (Mém. Ternstr. 56). 1855. — Szyszylowicz in Nat. Pflanzenfam. III. **6:** 185, 189. 1893.

Gordonia semiserrata (Nees) Sprengel, Syst. Veg. Cur. Post. **4**(2)**:** 260, 408. 1827.

Laplacea semiserrata (Nees) Cambessedes in St. Hilaire, Fl. Bras. Merid. **1:** 300. 1827; in Mém. Mus. Genève **16:** 407, *t. 1, fig. A.* 1828. — Spach, Hist. Nat. Veg. **4:** 76. 1835. — Hooker in Curtis's Bot. Mag. **70:** *t. 4129.* 1844. — Wawra in Martius, Fl. Bras. **12**(1)**:** 289. 1886. — Melchior in Nat. Pflanzenfam. ed. 2, **21:** 136. 1925. — Standley in Field Mus. Nat. Hist., Bot. ser. **18:** 702 (Fl. Costa Rica 702). 1937.

Laplacea semiserrata (Nees) Cambessedes *β acuminata* St. Hilaire, Fl. Bras. Merid. **1**: 300. 1827. — G. Don, Gen. Syst. **1**: 569. 1840.
Laplacea inaequilatera Schott in Sprengel, Syst. Veg. Cur. Post. **4**(2): App. 408. 1827.
Laplacea praemorsa Splitgerber in Hoeven & De Vries, Tijdschr. **9**: 100. 1842; iter. ex Mohl. Bot. Zeit. **1**: 95. 1843.
Laplacea camellioides Sonder in Linnaea **22**: 549. 1849.
Haemocharis parviflora Choisy in Mém. Soc. Phys. Hist. Nat. Genève **1**: 144 (Mém. Ternstr. 56). 1855.
Haemocharis caracasana Linden & Planchon, Trois. Voy. Linden [Bot., Pl. Columb.] **1**: 59. 1863. — Sprague in Kew Bull. **1926**: 43. 1926.
Laplacea semiserrata (Nees) Cambessedes var. *communis* Wawra in Martius, Fl. Bras. **12**(1): 289. 1886.
Laplacea caracasana Kl. & Karsten ex Wawra in Martius, Fl. Bras. **12**(1): 289. 1886, in syn.
Haemocharis camellioides (Sonder) Kuntze, Rev. Gen. Pl. **1**: 62. 1891.
Haemocharis praemorsa (Splitgerber) Kuntze, Rev. Gen. Pl. **1**: 62. 1891.
Laplacea inaequalilatera Hooker & Jackson, Index Kew. **2**: 30. 1894, sphalm.
Lindleya fruticosa Hooker & Jackson, Index Kew. **2**: 89. 1894, lapsu.
Haemocharis semiserrata Martius & Zuccarini var. *α communis* Pulle, Enum. Pl. Surinam 304. 1906.
Wikstroemia fruticosa Schrader var. *communis* (Wawra) Blake in Contrib. Gray Herb. **53**: 39. 1918.

Large trees up to 30 m. high with terete branchlets, brown or reddish brown, glabrous, sometimes appressed pubescent at the apex. Leaves usually disposed at the ends of the branchlets, occasionally along the stem, submembranaceous, subcoriaceous to coriaceous, up to 10 cm. long, asymmetrical, one side appearing constantly as half an ellipse with the widest point 0.7 cm. or less at the middle, the other side wider with the widest portion (ca. 1.5 cm.) usually above the middle, sometimes very close to the apex, rarely at the middle or below, thus effecting either an obtuse or acute apex according to the place or the extent of the extended portion, glabrous or glabrescent, occasionally pubescent along the midrib on the lower surface, usually obtuse sometimes acute at the apex, tapering to a sessile or subsessile base, the margin entire on the smaller side of the leaf, serrulate on the upper half of the larger or extended side, the veins usually obscure on both surfaces. Flowers solitary, axillary; pedicel erect or recurved, terete, usually appressed pubescent, glabrescent, ca. 1 cm. or less long; sepals 5, imbricate, concave, rounded, thick, appressed pubescent on the dorsal surface except for the membranaceous margin which is wider on the inner sepals, usually 1 cm. or less long, occasionally larger; corolla as much as 6 cm. across, usually less, ca. 3 cm. across, the petals 5 or more, obovate, white, malodorous, deeply cleft at the apex, usually ca. 1.5 cm. long and 1 cm. wide, occasionally as much as 3 cm. long and 2 cm. wide, pubescent on the median portion of the external surface; stamens very numerous, seriate, usually about one-quarter the length of the petals; ovary globose, densely sericeous when young, glabrescent,

ridged, usually 5-loculate, each locule with few ovules, the styles 5, short, glabrous, topped by 5 bifid spreading stigmas. Capsule subligneous, obovate, ridged, ca. 2 cm. long, glabrescent, usually 5-celled (occasionally more) with few seeds in each locule typical of the genus.

BRAZIL: Bahia: Igreja Velha, *J. S. Blanchet 3342* (Ch, G, US), in 1841.—Between Vittoria and Bahia, *A. Humboldt 514* (G), Feb. 1836. Paraná: Iacarehý, in silvula, *P. Dusen 15451* (G, NY, Mo, US), *15451a* (Ch, G, Mo, NY, US), Aug. 28, 1914. Rio de Janeiro: near Rio de Janeiro, *L. Riedel 7* (G), *243* (US), *1593a* (NY, US); *M. A. Glaziou 11799* (Ch, NY, US), Aug. 6, 1880; *A. Gomez 3* (Ch) in 1830.—Rio de Janeiro, Recreio dos Bandeirantes near edge of woodland and heath, *B. Lutz 708* (AA, US), Nov. 1931, *s. n.* (US), Sept. 10, 1933.—"Serra do Itatiaia, retiro in campo lapidosa," *P. Dusen s. n.* (US), June 15, 1902. Sao Paulo: Alto de Serra, *F. C. Hoehne 2373* (AA, NY, US), Aug. 20, 1918 (large tree; flowers white with a "loathsome" odor).—Jardin Botanique, *F. C. Hoehne 23832* (G), Dec. 10, 1932. Precise locality lacking: *W. J. Burchell 3123* (G) and *J. E. Pohl s. n.* (Ch).

BOLIVIA: Dept. La Paz: Prov. S. Yungas, basin of Rio Bopi, Asunta (near Evenay), *B. A. Krukoff 10622* (AA, Ch, Mo, NY), July 27–31, 1939.—Near Yungas, alt. 1300 m., *H. H. Rusby 485* (Ch, G, Mo, NY, US) in 1885.

PERU: Huanuco, Central Andean Cordillera, Mirador, along road from Acomayo to Chincas, in rain-forest, alt. 2400 m., *Y. Mexia 4137* (G), *7759* (Mo, US), Nov. 5, 1935 (tree 22 m. high with brown-gray bark and white corolla).

VENEZUELA: Terr. Fed. Amazonas: Mt. Duida, Savanna Hills, dry laterite soil at summit, alt. 1460 m., *G. H. H. Tate 787* (NY, US), Aug. 1928-April 1929.—Mt. Duida, Aguita, alt. 1000 m., *G. H. H. Tate 934* (NY, US), Aug. 1928-April 1929. Bolivar: "Cerro Sarisarinama, en les caberceras de los ríos Canaracuní y Merevari," alt. 600–800 m., *F. Cardona 380* (US), Jan. 6, 1942. Anzoategui: along Río Zumbador and tributary, near base of Piedra Blanca, northeast of Bergantin, on ridge top, alt. 1100–1450 m., *J. A. Steyermark 61344* (AA, Ch), March 1, 1945 (tree 40–60 ft.). Sucre: forest along northeast-facing quebrada tributary to Rio Manzanares, between La Trinidad and ridge connecting Cerro de Diablo (western extension of southern peak of Cerro Turumuquire), alt. 1300–1900 m., *J. A. Steyermark 62756* (AA, Ch), May 12, 1945 (tree 25–30 ft.; leaves erect, subcoriaceous, deep green above, yellow or pale green flushed with rose-lavender beneath). Merida: rich steep northwest- and northeast-facing forested slopes above "La Isla," above Tabay, alt. 2285–2745 m., *J. A. Steyermark 56641* (AA, Ch), May 18, 1944 (tree 25–85 ft.; leaves subcoriaceous, deep green above, dull paler green below).—Tovar, *A. Fendler 131, in part* (US), *132* (G). Dist. Federal: Lauteurs de Carocas, alt. 5000 ft., *J. Linden 1464* (Ch, isotype of *L. caracasana* Tr. & Pl.), Sept. 1843 (fls. blanches odorantes). Trujillo: *N. Funck & L.-J. Schlim 744* (isotype of *H. parviflora*, Ch; photo, AA, Ch).

DUTCH GUIANA: Sandrij I, in jungle, *W. A. Archer 2764* (AA, US), *2809* (Ch, US), Nov. 14–25, 1934 (tree 30–50 ft.; petals white, pink-tinged with age; scraped bark used as fish poison for small fish).—"In sylvis reg. inter. ad fl. Surinam," *Hostmann & Kappler 1287* (G, Mo, NY).

FRENCH GUIANA: along the Maroni River, *M. Melinon s. n.* (AA, US), in 1862. Precise locality lacking: *G. Wachenheim 47* (Ch), Dec. 1919.

PANAMA: Prov. Panama: Rio Indio drainage, about nine miles east of the trans-isthmian highway, rain-forest, alt. 800 ft., *W. R. Barbour 1055* (Ch), Mar. 23, 1946 (tree 100 ft.). — Cerro Campana, *P. H. Allen 2085* (Mo, US), Dec. 31, 1939 (tree 12 m. high with white fls.).

COSTA RICA: San Isidro del General Chirripó Grande Mt. in the Talamanca Range, high forest, *R. E. Danforth 48* (Ch), Aug. 20, 1936 (tall tree with small light crown; fls. malodorous, creamy white, below the leaves and facing earthward). — San Pedro de la Calabaza, alt. 1100 m., *A. Tonduz 10331* (US), Oct. 1896.

Geographically, this species is distributed from the southern states of Brazil across to Peru and Bolivia and north through Panama into Costa Rica. This distribution is by far the most extensive of any species in the genus.

Very great variation is found here in the characters most commonly employed in the delimitation of species within the family, thus making it quite difficult to present a clear-cut picture of the species. It belongs to the group having asymmetrical leaves — and in this character is quite consistent. Also the serration, varied in itself, is found only along the upper portion of the distended half of the leaf. However, in *Steyermark 56641*, two sheets carefully collected and labeled by the collector with the same number and deposited in the Chicago Museum of Natural History, both asymmetrical and symmetrical leaves are shown. One might suspect an error in numbering except that on the sheet with mostly symmetrical leaves a few leaves are found that are asymmetrical. The leaves on the Arnold Arboretum specimen of the same number are all symmetrical. I am of the opinion that dimorphism in the leaves is more prevalent in this species than is realized. Several specimens have been designated as belonging here which show clearly symmetrical herbaceous leaves serrulate along the margin on both sides. These leaves are generally on sterile specimens and may belong to young shoots. If it were not for the startling example shown by Standley and Hess in *L. grandis* (*L. Brenesii*), one would hesitate to place the specimens here — or even in the genus. Because of the element of doubt in the mind of the present author, these specimens have not been cited above. They are *Steyermark 56409* and *Pittier 14386* from Venezuela, *Archer 2708* from Dutch Guiana, *Espina & Giacometta A37* and *A160* from Colombia, and *Barbour 1001* and *1009* from Panama.

The shape of the leaf often varies to such an extent that it makes difficult a decision as to the lines of specific demarkation. The apex of the leaf is generally quite obtuse, and the widest portion of the leaf is near the apex. However, this is not always the case. It appears that on this asymmetrical (the larger) half of the leaf, the widest portion may be found at the middle or rarely even below the middle. In such cases the apex is quite acute — even acuminate in some instances. Two specimens, *Tate 787* and *934*, from the same general locality, Mt. Duida, illustrate this variation. In *Tate 787* the widest portion of the leaf is near the apex and

measures as much as 2.5 cm. across. Here the apex is quite obtuse. In *Tate 934* the widest portion is at or below the middle of the leaf and measures ca. 1 cm. The apex in the latter specimen is definitely long-acuminate. In all instances in the material studied the variation appears to be caused by the position and width of the wider half of the leaf. On the other half of the leaf hardly any variation is found.

The size of the flower also has presented difficulty in delimitation, and both species and varieties have been described which in truth belong to this variable species. I feel that the flowers generally most characteristic of the species are those that measure ca. 3.5 cm. across, in which the petals measure 1.5 × 1.2 cm. However, one frequently finds flowers measuring as much as 6 cm. across, with the individual petals measuring 3 × 2 cm. — as large as the whole flower mentioned above. Two specimens collected by P. Dusén at the same locality (Iacarehý, Bahia) in Brazil illustrate this variation. Dusén numbered his specimens *15451* and *15451a*. In all respects other than flower size these two numbers are identical. In *Lutz s.n.* in the U. S. National Museum both large and small flowers are found on a single branch.

This species has been known for many years as *Laplacea semiserrata*, based on *Lindleya semiserrata* Nees. For clarification concerning the name I quote from a previous publication (Kobuski in Jour. Arnold Arb. 28: 436. 1947).

"Because of the obscurity of the publications, I relate below in detail the circumstances concerning the early publications of the names *Wikstroemia fruticosa* Schrader and *Lindleya semiserrata* Nees.

"In the short span of 33 days in the year 1821 the real story of the genus was unfolded. On May the fifth, 1821, Schrader, in Göttingische gelehrten Anzeigen (No. 72, p. 710), a publication which evidently appeared three times weekly, published the new genus *Wikstroemia*, and on the following page listed a single species *W. fruticosa*, spelled "fructicosa." This new binomial was based on a specimen (no. 15), collected by Prinz Maximilian von Neuwied in Brazil. The generic description was in Latin and as complete as any of the descriptions for members of the Theaceae at that time. There could be no questioning of the date since a date appeared on every leaf of the publication, varying, of course, with the time of publication.

"In the same month, at Regensburg, on May the twenty-first, Nees, in volume 4 of Flora, known also as Botanische Zeitung Regensburg (no. 19, p. 299), published a new genus *Lindleya*, giving no specific name, however. Nees had received a duplicate set of the Brazilian plants collected by Prinz Maximilian von Neuwied. By an odd coincidence Nees based his new genus *Lindleya* on the same Neuwied number which Schrader had cited in his publication of approximately two weeks earlier.

"It may be assumed that Nees saw Schrader's publication of May 5, 1821, very shortly after it appeared, for on June 7 Nees (Flora vol. 4, p. 328) listed the combination *Lindleya semiserrata*, but merely as a syno-

nym of *Wikstroemia fruticosa*. He mentioned that his own work on the collection was in manuscript form and in the hands of the collector (Neuwied) at the time. He further stated that he would rescind his earlier abstract (presumably that of May 21, 1821), since its publication was antedated by that of Schrader. He wrote also that, since it would be very instructive to see just how he agreed or disagreed with Schrader's treatment, he would offer a bit of amusement for the readers of 'Flora' by listing his synonyms along with the original names of Schrader.

"There seem to have been approximately fifty numbers in the set of specimens worked over by Schrader. Nees' set was less complete, since he listed twelve numbers as missing from his set. Of the approximate thirty-five numbers which the two workers had in common, Nees offered synonyms for fifteen of Schrader's new species. Of course these synonyms of Nees were all actually new combinations. His manner of listing is as follows: '15. Wickstroemia fruticosa Schr. ist Lindleya semiserrata m.'

"Just what feeling existed between the botanists of that time is difficult to ascertain; also the circumstances regarding the publication of the identifications on the Prinz Maximilian von Neuwied collection. At any rate, in the same year, Sprengel, in Vet. Akad. Handl. Stockholm 1821: 167. 1821, published a second genus, *Wikstroemia* (Compositae), named after the same Dr. J. E. Wikström. He ignored Schrader's genus of the same name, failing to mention its existence. A footnote by the editor drew attention to Schrader's earlier *Wikstroemia* but stated that it was understood to be merely a synonym of Nees' *Lindleya*. The exact month of the last-mentioned publication is not certain. However, the complete action involving this confusion in synonymy took place in less than eight months!

"In the following year (1822) Humboldt, Bonpland & Kunth (Nov. Gen. Sp. Pl. 5: 207) introduced the genus *Laplacea*, the name now conserved by the 'International Rules.' The date printed in the front of the volume was 1821, which might have confused the issue even further. However, according to Barnhart in Bull. Torrey Bot. Club 29: 595. 1902, the date of publication has been ascertained as 1822, rather than 1821. The type-species was in no way involved by the creation of the genus *Laplacea*, since H. B. & K. described *L. speciosa* from Peru in their work, not the species under discussion. *Laplacea speciosa* was designated as the type of the genus when the generic name *Laplacea* was conserved.

"Four years later (1826), Martius and Zuccarini in Nov. Gen. Sp. 1: 107, *t. 66*, entered still another name, *Haemocharis*, and used the binomial *H. semiserrata*. *Lindleya* Nees was reported in the synonymy of *Haemocharis*, but not the binomial *L. semiserrata*.

"The next year (1827), Cambessedes, in St. Hilaire, Fl. Bras. Mer. 1: 300, accepted *Laplacea* and transferred thereto *Haemocharis semiserrata*, attributing the parenthetical authorship to Martius & Zuccarini. Since that time the species has been recorded under either *Laplacea* or *Haemocharis* with the specific name 'semiserrata.'"

1a. **Laplacea fruticosa** var. **pulcherrima** (Melchior), comb. nov.

Laplacea pulcherrima Melchior in Nat. Pflanzenfam. ed. 2, **21:** 136. 1925.

PERU: exact locality not given, *A. Weberbauer 9749* (TYPE, Berlin [not seen]; photo Ch, G).

BRAZIL: Amazonas: Municipality Humayta, on plateau between Rio Livramento and Rio Ipixuna, on campinarana, *B. A. Krukoff 7005* (AA, Ch, NY, US), Nov. 1934 (tree 70 ft. high). Para: Belem, Utinga, forest, sandy banks of river, *A. Ducke 832* (Mo, US), Nov. 7, 1941 (moderate-sized tree with white flowers). — Belem, *J. Huber 1675* (US), Nov. 1899. — Obidos, *A. Ducke 15121* (US), Dec. 10, 1913.

This variety is not extremely distinctive from the species, being characterized by larger leaves (12 × 3 cm.) and flowers, and strong silky sepals. The petals in the type measure ca. 2 cm. long, which is not unusually large when compared with some of the Brazilian representatives of the genus. In the specimens cited above the serration is less pronounced than in most representatives of the species. Like several other theaceous species offered by Melchior, the description is quite incomplete, consisting only of the characters as used in the key.

In distribution this variety appears to be confined to the Amazon valley, extending from Peru across Brazil through Amazonas to Para.

1b. **Laplacea fruticosa** var. **sericea** (Wawra), comb. nov.

Laplacea semiserrata (Nees) Cambessedes var. *sericea* Wawra in Martius, Fl. Bras. **12**(1): 290. 1886.

BRAZIL: Rio de Janeiro: Nova Friburgo, *M. A. Glaziou 11798* (photos of TYPE of *L. semiserrata* var. *sericea,* Ch, G; fragment, Ch), in 1881.

Only a single leaf and a photograph of the type have been available for this study. The outstanding character which separates the variety from the species is a dense silvery sericeous pubescence on the under surface of the leaf, the younger branchlets, and the calyx and pedicel. The leaf is generally smaller, measuring 4–6.5 cm. long and 1–1.5 cm. wide, asymmetrical, and lightly dentate near the apex on one side.

Wawra described the leaves of this variety as ". . . integris, aequilateris . . ." This is very misleading, since close observation shows the margin to be dentate and the outline clearly asymmetrical.

The variety appears to be very rare, having been collected only once. Material typical of the species was collected by Glaziou in the same locality and probably at the same time, since the two numbers are consecutive.

1c. **Laplacea fruticosa** var. **symplocoides** (Triana & Planchon), comb. nov.

Laplacea symplocoides Triana & Planchon in Ann. Sci. Nat., sér. 4, **18:** 269. 1862. — Walpers, Ann. Bot. **7:** 367. 1868. — Wawra in Martius, Fl. Bras. **12**(1): 291. 1886. — Melchior in Nat. Pflanzenfam. ed. 2, **21:** 136. 1925.

Haemocharis symplocoides (Triana & Planchon) O. Kuntze, Rev. Gen. **1:** 62. 1891, as *"H. symplocodes."* — Szyszylowicz in Nat. Pflanzenfam. III. **6:** 185. 1893.

Wikstroemia symplocoides (Triana & Planchon) Blake in Contrib. Gray Herb. n. s. **53:** 41. 1918.

COLOMBIA: "Alto Batatas, andes de Bogata," alt. 2500 m., *J. Triana 1866* (TYPE of *L. symplocoides;* photo, AA, Ch).—Caldas, *M. T. Dawe 790* (NY, US), in 1918 (handsome flowering tree).—Dept. de Huila, Cordillera Oriental, "vertiente occidental, bosques más arriba de Guadalupe en Resina," alt. 1850–1900 m., *E. P. Arbelaez & J. Cuatrecasas 8344* (US), March 20, 1940 (tree 30 m. with the trunk 60 cm. diam.; fls. white or greenish white).

VENEZUELA: Merida: Párama del Molino, alt. 2600 m., *A. Jahn 941* (US), Jan. 19, 1922.—Dwarf cool forest between El Molino and ridge above San Isidro Alto, alt. 2430–2895 m., *J. A. Steyermark 56520* (AA, Ch), May 14, 1944 (shrub 5–10 ft. tall; flowers showy, malodorous, the perianth white, the sepals pale greenish white tinged with lavender, the anthers golden with whitish filaments; leaves coriaceous, dark green above, paler green below).

ECUADOR: Prov. Carchi, Canton Tulcan, Los Olivos, on slopes of virgin forest, alt. 3200 m., *Y. Mexia 7460* (Cal, G, US), July 11, 1935 (tree 23 m. tall, the circumference 1 m. at 2 ft.).

It appears that the only character in which this variety consistently differs from the species is in the entire margin of the leaf. In fact, most of the specimens cited above have been identified with the species at one time or another. Of the specimens examined, *Jahn 941* from Venezuela and *Mexia 7460* from Ecuador match the type (photograph) most closely.

The apex of the leaf is usually quite obtuse, often rounded, with the largest portion of the extended half nearest the apex. The tapering of the leaf toward the apex is less abrupt in the variety.

It is difficult to associate Steyermark's *56520,* a shrub 5–10 ft., with Mexia's *7460,* which is a tree with a circumference of one meter at 2 ft. from the ground. Mexia adds that her specimen was taken from one of the smaller trees of the group. However, this variation, though seldom as extreme as this, is often found in other species of the family.

Cited here, perhaps, may be *Steinbeck 8937* from Bolivia. This is a sterile specimen but seems most closely related to this variety.

2. **Laplacea robusta,** spec. nov.

Arbor parva (ca. 8 m.) vel grandis (fide coll.), ramulis teretibus glabris, crasso-robustis, rubris vel brunneo-rubris, cortice mox exfoliata. Folia in ramuli apice conferta, erecta, crasso-coriacea, sessilia, inaequilatera, ad 10 cm. longa et 4 cm. lata, apice obtusa vel rotundata, basi late attenuata, utrubique glabra, costa supra canaliculata (raro juventute pubescentia), subtus elevata, margine recurvata, integerrima, nervis obscuris. Flores non visi. Fructus axillares, solitarii, pedicello robusto 3–5 cm. longo, ca. 5 mm. diametro, angulato, glabro; capsula glabrescente ad 4 cm. longa, obovata, apice ca. 2 cm. diametro, 5-angulata, 5-loculata, seminibus paucis, typicis.

COLOMBIA: "Departamento del Huila-Commisaria del Caquetá: Cordillera Oriental sobre el filo divisoria, en Gabinete," alt. 2300–2450 m., *J. Cuatrecasas 8476* (US, TYPE; fragment and photo, AA), March 22, 1940 (small tree 8 m. high or large tree; flowers white, odorous).

This new species belongs to the group of species known to possess asymmetrical leaves and appears to be most closely allied to *L. fruticosa* var. *symplocoides*. In both entities the leaves are entire along the margin. However, in *L. robusta* the leaves are larger and more thickly coriaceous. The pedicels are angled and much larger, measuring up to 5 cm. long and 5 mm. in diameter, erect and glabrous. The fruit on the long, robust pedicel is corresponding in size, measuring up to 4 cm. long, easily the largest seen in any American species. Although flowers are not available for this study, I am sure that when collected they will be easily recognized as belonging to this species, since in size they will probably correspond to the known parts of *L. robusta*. Although only mature fruits are found on the type, the collector mentions that the flowers are white and odorous.

The plant is for the most part glabrous. The ovary, like that of all species of the genus, was obviously quite pubescent. In the development of the fruit this pubescence is lost. The leaves are glabrous except for a fine growth of pubescence found in the canaliculate midrib on the dorsal surface of the younger leaves. This pubescence vanishes with age.

Although no mention is made by the collector of the red coloration on the branchlets and leaves, it is obvious that along the midrib and the base of the leaves the red color characteristic of many species of this family is present. This deep red color appears to be present on the fruit also.

The bark on the young branchlets is definitely exfoliate. This character is not new to the group but is quite uncommon.

3. **Laplacea grandis** T. S. Brandegee in Univ. Calif. Publ. Bot. 6: 186. 1915. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 136. 1925.

Wikstroemia grandis (Brandegee) Blake in Contrib. Gray Herb. n. s. **53**: 40. 1918.

Laplacea Brenesii Standley in Field Mus. Publ. Bot. (Fl. Costa Rica) **18**: 701. 1937. — Record in Trop. Woods **70**: 30. 1942; **80**: 2. 1944.

Laplacea Williamsii Standley ex Ll. Williams in Lilloa **4**: 145, 165. 1939, *nomen*.

Large trees up to 30 m. high; the top rounded, the bark gray; branchlets numerous, subterete, glabrous except for pubescent new growth. Leaves congested at the apex, stiff-coriaceous [membranaceous],* quite symmetrical, pubescent when young, quickly glabrescent, ovate, elliptic or obovate, 9–15 cm. long, 3–5 cm. wide [20–30 cm. long, 9–11 cm. wide], acuminate at the apex, tapering at the base into a short petiole [base subauriculate], the margin crenate-serrate, the midrib plane or somewhat canaliculate above, elevated beneath, the veins 8–12 pairs [10–17 pairs, very prominent], conspicuous on both surfaces. Flowers axillary, solitary or in pairs on a single peduncle; peduncle terete, ca. 3 cm. long, finely tomentose with mixed pubescence, the pedicels of similar length and characteristics; sepals 5, persistent, imbricate, very small, ca. 3 mm. long, rounded, densely covered with a minute matted mixed pubescence, con-

* The bracketed portions of the above description refer only to a second form, discussed below.

spicuously ciliate; petals white, obovate, 1.5–2 cm. long, 0.8–1–2 cm. wide, rounded at the apex, conspicuously connate for ca. 5 mm. at the base, forming a tube, the outermost petal thicker and wider (2 cm.), finely stellate-pubescent on the dorsal surface, densely so on the whole dorsal surface of the outer petal, lightly so on the basal or median portion of the inner petals; stamens very numerous, 6–7 mm. long, the filaments joined for the entire length or nearly so, forming a staminal tube, the anthers oblong, 1.5 mm. long and 0.5 mm. wide; ovary oblong-elliptic, densely sericeous, especially near the base, 5-celled, the style lacking, the stigma 5-lobed, stellate, fitting together at the apex and extending down the side of the ovary. Capsule ovoid or globose, 2–3 cm. long, 1–2 cm. wide, pubescent, 5-loculate, the seeds winged, ca. 15 mm. long, 5 mm. wide.

TYPICAL MATERIAL WITH FLOWERS OR FRUIT:

MEXICO: Chiapas: Finca Mexiquito, *C. A. Purpus 7092* (TYPE, Cal), July 1913 (very large tree).—Finca Irlanda, *C. A. Purpus 7120* (Cal), Sept. 1913. Oaxaca: midway between Monte Negro and San Juan Lalano, lat. 17°26′, long. 95°45′, alt. 450 m., *R. E. Schultes & B. P. Reko 798* (AA), May 6, 1939 (very large tree).—Ubero, *Ll. Williams 9170* (Ch, Mo, US), April 1937.

COSTA RICA: Prov. Alajuela: Los Angeles de San Ramón, in forest, alt. 1050 m., *A. M. Brenes 4379* (TYPE of *L. Brenesii*, Ch), Aug. 21, 1925 (tree 8–10 m.; fls. white, very fragrant).—Between La Balsa and Cataratas de San Ramón, in woods and fields, alt. 850 m., *A. M. Brenes 4506* (Ch), Oct. 12, 1925 (tree 15–20 m. with white flowers).—La Palma de San Ramón, in forest, alt. 1050 m., *A. M. Brenes 5357* (Ch), *5791* (Ch), Jan. 16 & Nov. 10, 1927 (tree 30–40 m.).—La Palma y El Socorro de San Ramón, *A. M. Brenes 6201* (AA, Ch, US), *6201a* (AA), *6215* (Ch), July 1928. Prov. Guanacaste: Canas Goedas, alt. 1100 m., *H. Pittier 11176* (US), Feb. 28, 1897.

GUATEMALA: Dept. Zacapa: Sierra de la Minas, between Cerro de Monos and upper slopes of Monte Vergen, alt. 2000–2600 m., *J. A. Steyermark 42880* (AA, Ch), Jan. 17, 1942 (leaves stiff-coriaceous, rich shining green above, pale green beneath).

PANAMA: Prov. Panama: Rio Indio drainage about nine miles from trans-isthmian highway, rain-forest, alt. 800 ft., *W. R. Barbour 1053* (Ch), Mar. 23, 1946 (tree 80 ft.).

ATYPICAL STERILE MATERIAL:

GUATEMALA: Dept. San Marcos: south-facing slopes of Volcán Tajumulco, alt. 1300–1600 m., *J. A. Steyermark 37361* (AA, Ch), *37544* (Ch), March 1940 (leaves firmly membranaceous). Dept. Zacapa: Sierra de la Minas, slopes of Monte Virgen, around summit of mountain, alt. 2200–2400 m., *J. A. Steyermark 42611a* (Ch), Jan. 1942 (tree 30 ft. tall; leaves firmly chartaceous, rugose above). Dept. Sololá: Volcán San Pedro, north-facing slopes toward Lago de Atitlan, above village of San Pedro, in damp cloud forest dripping with mosses and hepatics, alt. 8300–9400 ft., *J. A. Steyermark 47252* (Ch), June 7, 1942. Dept. Alta Verapaz: large swamp just east of Tactic, alt. 1300 m., *J. A. Steyermark 43992* (Ch), Feb. 1942 (tree 75–100 ft., leaves firmly membranaceous).—Mountain along road between Tactic and the divide on the road to Tamahú,

dense wet forest, alt. 1500–1600 m., *P. C. Standley 91355* (Ch), April 1941 (shrub).—Near Tactic, wooded swamp, alt. ca. 1500 m., *P. C. Standley 91576* (Ch), April 10, 1941 (shrub).

HONDURAS: summit above El Achote, above the plains of Siguatepec, in thickets at the edge of the forest, alt. 1800 m., *T. G. Yuncker, R. F. Dawson & H. R. Youse 6201* (Ch), July 7, 1936 (small tree 12 ft. high).

This species, which extends geographically from southern Mexico to Panama, may be distinguished from all other species of the genus by the following characters: (1) The calyx-lobes are unusually small for the genus, measuring only ca. 3 mm. in length, and are persistent, resembling more those found in the genus *Cleyera*. (2) A characteristic crown-like stellate pubescence is found on various parts of the leaves and flowers and is especially noticeable on the dorsal surface of the inner corolla-lobes. (3) Although usually solitary and axillary, frequent occurrences of at least two flowers on a single peduncle are noted. (4) The corolla is tightly compressed, appearing globose well after the small calyx-lobes have opened, due for the most part to the thicker, larger and concave outer corolla-lobe. The corolla is also connate at the base for approximately 5 mm. in the form of a tube. (5) The filaments are united in a distinct tube, with the anthers free.

This species differs from the other members of the genus in so many characters that one might be inclined to consider it generically distinct. However, research carried on by Record at Yale convinced him that anatomically it belongs to *Laplacea*.

In the citation of specimens above it will be noted that two categories are listed, namely: "Typical material with flowers or fruit" and "Atypical sterile material" — how else to cite them I do not know. It is difficult for me to accept the so-called "atypical" material as belonging to this species, not to mention the genus. However, it seems that after having been baffled for some time by this material, P. C. Standley sent wood specimens to Record at Yale for study and Record not only designated this family but also stated that "the exact species was indicated — *Laplacea Brenesii* Standley." Considering this extraordinary variation of great interest I am quoting below the short note published by Record in Tropical Woods (80: 2. 1944) concerning this variation.

"Identifying *Laplacea Brenesii*.

"Following is a striking instance of the aid a wood anatomist may be able to give a taxonomist working with sterile herbarium material. Recently I received from Paul C. Standley, of the Chicago Natural History Museum, a small piece of wood collected by Mr. Steyermark in Guatemala. He wrote that he had at least seven collections of the same tree from different parts of Guatemala and some others from Honduras and Panama, and added that the leaves looked to him more like *Meliosma* than anything else.

"Fortunately for my purpose the wood in question has solitary vessels and scalariform perforation plates so that it was a very simple matter to

find it in two of the keys of the series I have been publishing. Furthermore, the exact species was indicated — *Laplacea Brenesii* Standley.

"I reported my findings to Mr. Standley and by return mail received his confirmation of my diagnosis. 'There is no question as to the correctness of the name, but the variations in foliage are extraordinary. The leaves of sterile young branches are *very* unlike those of fertile branches. We have just one fertile collection (in old fruit) from Guatemala, so weatherbeaten that for some time I did not recognize the family. If it and the sterile specimens were put side by side, few botanists would recognize any connection between them, just as in my case.

" 'Incidentally, one of the sterile specimens from Honduras was written up once by [another botanist] as a new species of *Quercus*, but I realized that it was at least no *Quercus* and suppressed the description.'

"*Laplacea Brenesii* differs from the other species of the genus particularly in its coarser texture. According to C. L. Lankester (see *Tropical Woods* 70: 30), it is abundant in the Cartago region of Costa Rica and in demand for scantlings for house and mill construction, but warps too badly in seasoning to make good boards."

The material is all labeled in Standley's characteristic handwriting. So different is it from the typical material of this species, that, were I to come upon an unlabeled sheet, I am afraid that I would continue to confuse it with some family other than Theaceae.

One thing the two groups have in common is a stellate pubescence. However, listed below are some of the variations.

Typical	Atypical
Leaves stiff-coriaceous	Leaves membranaceous or chartaceous
Leaves 9–15 cm. long, 3–5 cm. wide	Leaves 20–30 cm. long, 9–11 cm. wide
Leaves generally ovate	Leaves obovate
Leaves tapering so finely at the base that a decision concerning a petiole is difficult	Leaves subauriculate at base
Veins 8–12 pairs, obvious to obscure	Veins 10–17 pairs, very prominent

All specimens of the "atypical" material are sterile. One might assume these to have been collected from young growing shoots, thus accounting for this great variation. However, *Steyermark 43932* is recorded as a tree 75–100 ft. high and *Steyermark 37361* as a tree 20–30 ft. high.

There is no doubt in my mind, having had an opportunity to study the types of both *L. grandis* and *L. Brenesii*, that a single species is here represented. So much more publicity has been given the species under the latter name that it is with regret that I find it necessary to reduce it to synonymy.

4. **Laplacea speciosa** HBK., Nov. Gen. & Sp. 5: 209 (162, ed. folio), *t. 461.* 1822. — J. Kerner, Gen. Pl. Ill. 6: *t. 104.* 1822. — Sprengel, Syst. Veg. 2: 631. 1825. — G. Don, Gen. Syst. 1: 569. 1840. — Melchior in Nat. Pflanzenfam. ed. 2, 21: 136. 1925.

Haemocharis speciosa (HBK.) Choisy in Mém. Soc. Phys. Hist. Nat. Genève 1: 144 (Mém. Ternstr. 56). 1855. — O. Kuntze in Rev. Gen. Pl. 1: 62. 1891. — Szyszylowicz in Nat. Pflanzenfam. III. 6: 185. 1893.

Laplacea insignis Bentham, Pl. Hartweg. 126. 1843, *lapsu.*

Wikstroemia speciosa (HBK.) Blake in Contrib. Gray Herb. n. s. 53: 40. 1918.

Laplacea spectabilis Moricand, Plantae Amer. Rar. 3, 1830, *lapsu.*

Large tree; branches sparse, terete, gray, pilose-sericeous when very young becoming glabrous, roughened, eventually exfoliating in minute sheets. Leaves crowded at the apex of the branchlets, coriaceous, symmetrical, obovate, ca. 4.5 cm. long and 2 cm. wide, occasionally larger, sessile (appearing petiolate because of the decurrent base), obtuse to subrotund at the apex, usually slightly retuse, tapering at the base, the margin entire, somewhat revolute, especially toward the base, the veins obscure on both surfaces, occasionally very lightly tufted with pubescence at the apex of the under surface. Flowers axillary, solitary, the pedicel terete, slightly recurved, appressed-pubescent, usually less than 1 cm. long; sepals imbricate, usually 5, concave, quite rounded, ca. 7–8 mm. long, densely sericeous on the dorsal surface, thinly membranaceous along the margin; petals white, obovate, obtuse, usually deeply emarginate at the apex, ca. 3 cm. long and 1.5 cm. wide, occasionally larger, sericeous along the median portion of the external surface, the stamens numerous, ca. one-fourth the length of the petals, adnate to the base of the petals, the ovary densely sericeous, ridged, 5-celled, pauci-ovulate, the styles 5. Capsule woody, glabrescent, up to 2 cm. long, 5-angled, 5-valved, each cell with few seeds.

ECUADOR: Loja: "Crescit rarissime in sylvis inter Gonzanamam et urbem Loxae, alt. 1060 hexapod.," *A. Humboldt 3340* (photo of TYPE, Ch). — S. Loja, "Namanda," alt. 2400–2500 m., *R. Espinosa E 170* (AA, NY), April 18, 1946 (tree; leaves coriaceous, shiny; corolla white, somewhat fleshy).

VENEZUELA: Merida, Páramo del Molino, alt. 2800 m., *A. Jahn 896* (G, US), Jan. 24, 1922.

This species and the two following varieties appear to inhabit only the higher altitudes of the Andes mountain range in South America. Few specimens of this species seem to have been collected.

The outstanding characters are the glabrous symmetrical leaves, quite obtuse or rounded at the apex, with the margin entire. The calyx is appressed-pubescent on the external surface.

Only a photograph of the type was available for this study. However, laid out on the sheet were most of the floral parts as well as a rule, thus making it possible to obtain quite accurate measurements.

Also, a great help was the authentic specimen collected by *R. Espinosa* (*E 170*) from the type locality.

4a. **Laplacea speciosa var. intermedia** (Bentham), comb. nov.

Laplacea intermedia Bentham, Pl. Hartweg. 126. 1843. — Wawra in Martius, Fl. Bras. **12**(1): 290. 1886. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 136. 1925.

Haemocharis intermedia (Bentham) Choisy in Mém. Soc. Phys. Hist. Nat. Genève **1**: 144 (Mém. Ternstr. 56). 1855. — O. Kuntze, Rev. Gen. Pl. **1**: 62. 1891. — Szyszylowicz in Nat. Pflanzenfam. III. **6**: 185. 1893.

Wikstroemia intermedia (Bentham) Blake in Contrib. Gray Herb. n. s. **53**: 40. 1918.

ECUADOR: Loja: in mountains near Loja, *T. Hartweg 717* (fragm. of TYPE of *L. intermedia,* AA, Ch), 1841–1843. — Horta-Naque, in the high forest, alt. 3500 [m.], *R. Espinosa E 1023* (AA, NY), Nov. 9, 1946 (tree 6–10 m. high; leaves coriaceous; flowers white with rose-tinted exterior).

This variety, originally described as *L. intermedia* by Bentham in 1843, was based on a specimen collected by Hartweg (*717*) in the mountains of Ecuador near Loja between the years 1841 and 1843. Only a single specimen of this entity, as far as I know, has been collected since — and this just recently (1946) by Dr. Reinaldo Espinosa, probably from a locality close to that of the original specimen. Although the altitude of the place where the type was collected has not been recorded, one may be quite correct in assuming from the Espinosa collection at 10,500 ft. that the plant grows only at this very high altitude, and this assumption if justified by fact may account for the absence of specimens in American herbaria.

Comparing the fragment of the type and Espinosa's specimen with material of *L. speciosa,* the only differences appear to be the lower habit (tree 6–10 m.), the crowded branchlets, and the smaller leaves.

Some of the measurements, along with descriptive characters of *Espinosa E 1023,* are recorded here. When young, the branchlets are smooth, quite terete, and dark red in color, punctuated along the length by closely arranged leaf scars. The total length of the branchlets seldom exceeds 10 cm. In age the bark becomes gray, and is broken into small sections which eventually exfoliate. The leaves are coriaceous, small (measuring 3 × 1.2 cm.), obovate, symmetrical, entire, slightly retuse at the apex with occasional small tufts of hairs at the apex on the under surface (otherwise glabrous), thus resembling the variety *barbinervis.*

The flowers are solitary and axillary with short terete pedicels (ca. 0.5 cm. long) which are close-appressed-pubescent. The calyx-lobes are rounded, concave, appressed-pubescent and ca. 8 mm. long. The petals measure about 2 cm. in length.

The fruit is correspondingly small for the genus, measuring ca. 1 cm. in length, and is typically glabrescent.

4b. **Laplacea speciosa** var. **barbinervis** (Moricand), var. nov.

Laplacea barbinervis Moricand, Plantae Americanae Rariores 3, *pl. 2.* 1830; Plantes Nouvelles d'Amérique 16, *t. 11.* 1836; in Mém. Soc. Phys. Hist. Nat. Genève **7**: 256, *t. 11.* 1836. — Guillemin in Bull. Sci. Nat. et Geol. **23**: 78. October 1830. — Walpers, Repert. Bot. Syst. **1**: 372. 1842. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 136. 1925.

Gordonia barbinervis (Moricand) Walpers, Repert. Bot. Syst. **1**: 375. 1842.

Haemocharis barbinervis (Moricand) Choisy in Mém. Soc. Phys. Hist. Nat. Genève **1**: 144 (Mém. Ternstr. 56). 1855. — Szyszylowicz in Nat. Pflanzenfam. III. **6**: 185. 1893.

Wikstroemia barbinervis (Moricand) Blake in Contrib. Gray Herb. n. s. **53**: 38. 1918.

ECUADOR: Prov. Azuay: dense moist forested slopes bordering Río Collay, on slopes called Huagrarancha, south of El Pan, alt. 2650–3290 m., *J. A. Steyermark 53393* (AA, Ch), July 6, 1950 (tree 30 ft. tall; leaves coriaceous, silvery green below with purplish rose midrib, above dark green; petals white, showy; sepals deep rose). — Moist dense cloud-forested slopes of Huagrarancha, 1.5 leagues south of El Pan, alt. 3140–3350 m., *J. A. Steyermark 53399* (AA, Ch), July 8, 1943 (tree 30 ft. tall, the wood good for construction purposes; flowers showy, the petals white). Prov. Loja: between Tambo Cachiyacu, La Entrada, and Nudo de Sabanillas, alt. 2500–3500 m., *J. A. Steyermark 54477* (AA, Ch), Oct. 7, 1943 (tree 30 ft. tall; flowers with odor of carrion, showy, the petals white, the filaments creamy white, the anthers yellow; leaves silvery green below). Prov. Imbabura: ridge of "El Corazon," above junction of Río Blanco and Quebrada Curiyacu, alt. 9400 ft., *W. B. Drew & I. L. Wiggins 11* (Ch), June 11, 1944 (tree to 20 m. or more; leaves shining green above, lighter and somewhat rusty beneath; flowers with odor of carrion, the petals waxy white, the sepals reddish; the anthers bright yellow).

COLOMBIA: Dept. Nariño: "entre El Encano y Pasto, vertiente occidental de La Cordillera, bosques residuales entre Páramo del Tábano y Laguna," alt. 2700–2900 m., *J. Cuatrecasas 11945* (US), Jan. 11, 1941 (tree; petals white; sepals green-rose). Dept. Cauca: West Andes of Popayan, on crest of mountain, in dense forest, alt. 2800–3200 m., *F. C. Lehmann 5130* (Ch, G, US), (tree up to 6 m. high with close erect crown of branchlets; leaves coriaceous, dark green, somewhat brittle; flowers milky white). — Mt. St. Ana, Cordillera Occidental, shrub-zone, alt. 2700–3000 m., *F. W. Pennell 7454* (G, NY, US), June 29, 1922 (tree with white petals). — Mt. El Derrumbo, Cordillera Occidental, shrub-zone, alt. 2700–3000 m., *F. W. Pennell 7487* (G, NY, US), June 29, 1922 (tree with white petals).

This variety was originally described by Moricand as *L. barbinervis* and was separated from *L. speciosa* by the glabrous calyx, the smaller leaves, and the concentration of pubescence at the apex of the under surface of the leaf, which is otherwise glabrous.

Among the specimens cited above, *Steyermark 53393* is the best example of true *L. barbinervis* as interpreted by Moricand. The calyx is quite glabrous except for an occasional patch of pubescence on some of the outer sepals. The leaves are somewhat smaller than those of the type of *L. speciosa,* and the tuft of pubescence is present at the apex of the leaf. On the other hand, *Steyermark 53399,* collected in the same general locality on the same day, agrees with *53393* in all respects except that the calyx is strikingly silvery appressed-pubescent, especially on the outer lobes. *Steyermark 54477,* collected in the Province of Loja at a slightly lower altitude, has larger leaves measuring as much as 5.5 × 2.2 cm., which

are equal to those on the type of *L. speciosa*. The calyx on some flowers in the last specimen is glabrous. On other flowers occasional pubescent spots are to be discerned.

These specimens of Steyermark are used in this discussion because of their excellent preparation and also because the region of their collection is close to the type-locality of *L. barbinervis*, which is Guayaquil, Ecuador.

The tuft of pubescence at the apex of the leaf is very striking in the specimens cited above. However, this character is not distinctive of the variety, since evidence of it may be found on most specimens of typical *L. speciosa* and on other species of the genus.

Having taken these variable characteristics into consideration, I do not think this entity worthy of specific distinction but merely a variety of typical *L. speciosa*.

The following discussion deals with the date of publication of *L. speciosa* Moricand, the clarification of which is not truly important as far as this genus is concerned but may be of importance for establishing the priority of the other species described at the same time.

According to Moricand, complete Latin descriptions of ten new species were prepared and *printed* in 1830 under the title "Plantae Americanae Rariores," but the actual publication of these species was abandoned because the engraver had not prepared the plates according to agreement. This statement, dated 1846, concerning the publication of the above-mentioned paper appeared in a foreword to Moricand's "Plantes Nouvelles d'Amérique," which was published during the years 1833–1846. This same series of plants appeared, also during the years 1833–1846, in Mém. Soc. Phys. Hist. Nat. Genève.

The original ten species were described in the following sequence: *Brongniartia intermedia, Laplacea barbinervis, Ternstroemia Ruiziana, Ternstroemia Pavoniana, Hibiscus tampicensis, Hibiscus Berlandierianus, Hibiscus lavateroides, Sida filiformis, Sida anomala* var. *mexicana,* and *Platanus mexicanus*.

Obviously, the 1830 publication got into distribution, since there is a copy, *complete with plates* and text, in the library of the Arnold Arboretum. Pritzel (Thesaurus, 1872) must have seen a copy of the original, since he lists the species in the order in which they appeared in the 1830 publication. I mention this sequence of the species since Moricand, as far as I know, never listed the ten original species in any of his publications. The sequence of the original ten species differs in the later publications. In Pl. Amer. Rar. (1830), *Laplacea barbinervis* was described as the second species and was represented by plate 2. In Pl. Nouv. Amér. (1836), the same entity was treated as the eleventh species.

Pritzel (Thesaurus, ed. 2, 224. 1872) refers to a short review of Moricand's Pl. Nouv. Amér. in Bot. Zeit. **1847**: 475. 1847 by "S-l" (probably Schlechtendal), in which appears a German translation of the foreword of Moricand's 1846 publication. Checking this review of Schlechtendal, it should be noted that no listing of the original ten species was made. Yet Pritzel was able to record them — so he must have seen the original.

Also, Guillemin in Bull. Sci. Nat. et Geol. 23: 78. October 1830, the year of the original publication, reviews the earliest paper (1830) of Moricand and not only records (in order) the ten species but gives brief Latin descriptions of all of them. This in itself would constitute publication, and one must either accept the original date of Moricand or cite the ten species "Moricand ex Guillemin."

The vernacular names for this variety as recorded by Steyermark are: *pucanyahui, pucunllahui,* and *sumblid.*

5. **Laplacea acutifolia** (Wawra), comb. nov.

Laplacea semiserrata (Nees) Cambessedes var. *acutifolia* Wawra in Martius, Fl. Bras. **12**(1): 290. 1886.

Haemocharis acutifolia Martius ex Wawra in Martius, Fl. Bras. **12**(1): 290. 1886, in syn.

Haemocharis semiserrata (Nees) Martius & Zuccarini var. *acutifolia* (Wawra) Dusen in Archiv. Mus. Nac. Rio Janeiro **13:** 52. 1905.

Wikstroemia fruticosa Schrader var. *acutifolia* (Wawra) Blake in Contrib. Gray Herb. n. s. **53:** 39. 1918.

BRAZIL: Minas Geraes: Caldas, *A. F. Regnell "I 26¼"* (Ch, NY, US).—Sao Joao del Rey, Agua Geral-Serra do Lenheiro, *M. Barreto 4689* (AA, Ch), Aug. 8, 1936 (tree 0.5 m.).—*M. A. Glaziou 16709* (Mo, NY). St. Catherine: *Nadeaud s. n.* (Ch) in 1862. Precise locality lacking, *W. J. Burchell A550* (G) and *J. E. Pohl 2670* (Ch).

This species is characterized by narrow-elliptic or subelliptic membranaceous symmetrical leaves up to 10 cm. long, 2 cm. wide, acuminate at the apex, serrate on both margins, and quite glabrous on the under surface of the leaf.

The closest relationship is with *L. obovata,* which species differs in the obovate pubescent leaves, shorter as a rule and rounded to obtuse at the apex.

Formerly this species was associated with "L. semiserrata" by Wawra. Martius recognized it as a species under *Haemocharis* but had not published the combination. This combination first appeared as a synonym of *L. semiserrata* var. *acutifolia* in Wawra's studies.

6. **Laplacea spathulata,** spec. nov.

Arbor 20–30 metralis; ramulis teretibus, glabris, griseis. Folia in ramuli apice conferta, spathulata, membranacea, glabra vel glabrescentia, symmetrica, 7–9.5 cm. longa, 2.5–3 cm. lata, apice rotundata, basi longo-attenuata, supra nitida, subtus pallidiora, margine utrubique denticulata, ciliata, subrevoluta, venis 15–17 paribus, ad marginem anastomosantibus, petiolis brevissimis, ca. 3 mm. vel minus. Flores axillares, solitarii; pedicellis teretibus, 1–1.5 cm. longis, erectis vel recurvatis, adpresso-pubescentibus; sepalis 5, inaequalibus, concavis, suborbicularibus, undique pubescentibus, exterioribus ca. 8 mm. longis, 11 mm. latis, dense pubescentibus, margine angusto-membranaceis, interioribus ca. 12 mm. longis et 15 mm. latis, margine lato-membranaceis (ca. 5 mm.); petalis 5(–8), albis, obovatis, emarginatis, rare unguiculatis, inaequalibus, 2–3 cm.

longis, 1–2.6 cm. latis, dorso medio adpresso-pubescentibus; staminibus numerosis, ca. 3-seriatibus, 9–12 mm. longis, filamentis inaequalibus ca. 8–10 mm. longis, basi breviter connatis et petalis brevissime adnatis, antheris oblongis, ca. 2 mm. longis; ovario globoso, ca. 4 mm. diametro, dense sericeo, 5-angulato, 5-loculato, loculis pauci-ovulatis, stigmatibus 5.

PERU: Dept. Loreto: Mishuyacu, near Iquitos, in forest, alt. 100 m., *G. Klug 383* (C, US), Oct.-Nov. 1929 (tree 15 m. high with white flowers).—Mouth of Rio Santiago, on high land, *G. Tessman 4592* (NY) (tree 30 m.).

BRAZIL: Amazonas: basin of Rio Negro (Rio Tikie), *R. Froes 228* (Arnold Arboretum, TYPE; NY), April 29, 1942 (tree 70 ft. high).

The truly spathulate symmetrical leaves, denticulate on both margins with long tapering base and rounded apex, set this distinctive species apart from other known species in this region. By some workers two of the collections (*Tessmann 4592* and *Klug 383*) have been identified with "*L. quinoderma* Wedd." However, the latter species (now a synonym of *L. pubescens*) is quickly separated by the larger acuminate leaves which are densely pubescent and rough to the touch and less conspicuously tapering at the base.

The petals in *L. spathulata* vary considerably in a single flower, ranging from symmetrical obovate to broadly obovate unguiculate. Following are the measurements in centimeters of eight petals taken from one flower: 2×1, 2×1.2, 2.5×1, 2.5×1.5, 2.5×1.5, 2.8×1.2, 3×1.3, 2.5×2.6. All are emarginate. Only one petal (2.5×2.6) was truly unguiculate.

The concave sepals vary in like manner, especially in the membranaceous margin. The margin of the outer sepals is membranaceous for a distance of only a single millimeter. The width of the membranaceous part of the margin varies until in the inner sepal it may be as much as 4–5 millimeters.

This species may extend into Venezuela. A sterile specimen collected by *H. N. Whitford*, no. *38*, and deposited at the Gray Herbarium, probably belongs here. The tapering at the base of the leaf is more abrupt and less tenuous than in the specimen cited above.

7. **Laplacea obovata** (Wawra), comb. nov.

Laplacea semiserrata (Nees) Cambessedes var. *obovata* Wawra in Martius, Fl. Bras. **12**(1): 290. 1886.

Haemocharis obovata Martius ex Choisy in Mém. Soc. Phys. Hist. Nat. Genève **1**: 144 (Mém. Ternstr. 56). 1855, as syn.

Wikstroemia fruticosa Schrader var. *obovata* (Wawra) Blake in Contrib. Gray Herb. n. s. **53**: 39. 1918.

BRAZIL: Minas Geraes: *C. F. Martius 833* (Ch, Mo, NY), *1062* (NY), in 1841.—*P. Claussen 73* (NY), *454* (G), *s. n.* (G).—*F. Sello 4037*, in part (US). Precise locality lacking, *J. E. Pohl s. n.* (Ch); *F. Sello s. n.* (US); *E. Warming s. n.* (US).

This species is characterized by symmetrical membranaceous leaves,

obovate, obtuse to rounded at the apex, occasionally bluntly acuminate, pubescent on the under surface with striae of pubescence running parallel to the midrib, denticulate at the margin on both edges, and with ca. 10 pairs of veins distinct on the lower surface.

The leaves measure 6–8 cm. long and 2–3 cm. wide. On *Martius 833* smaller leaves are found which measure 4 × 1 cm. However, on the same specimen are found leaves measuring 6 cm. long and 2 cm. wide. Two species are represented on *Sello 4037*, namely *L. obovata* and *L. fruticosa*.

This species is closely related to *L. tomentosa*, which can be separated readily by the heavy coriaceous leaves, densely dark-tomentose beneath with no evidence of veins.

This species was originally described by Wawra as a variety of "*L. semiserrata*." The symmetrical leaves, denticulate on both edges, show that it is more closely related to *L. tomentosa*.

8. **Laplacea pubescens** Planchon & Linden ex Triana & Planchon in Ann. Sci. Nat. sér. 4, **18**: 269. 1862. — Walpers, Ann. Bot. 7: 367. 1868. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 136. 1925.

Haemocharis pubescens (Planchon & Linden) Linden & Planchon, Trois. Voy. Linden. [Bot. Pl. Columb.] **1**: 59. 1863 [repr. in Kew Bull. **1926**: 43. 1926].

Laplacea quinoderma Weddell, Hist. Nat. Quinquinas 33, 1849 (footnote). — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 136. 1925.

Haemocharis quinoderma (Weddell) Choisy in Mém. Soc. Phys. Hist. Nat. Genève **1**: 145 (Mém. Ternstr. 57). 1855. — O. Kuntze, Rev. Gen. Pl. **1**: 62. 1891. — Szyszylowicz in Nat. Pflanzenfam. III. **6**: 185. 1893.

Wikstroemia pubescens (Planchon & Linden) Blake in Contrib. Gray Herb. n. s. **53**: 40. 1918.

Wikstroemia quinoderma (Weddell) Blake in Contrib. Gray Herb. n. s. **53**: 40. 1918.

COLOMBIA: Santander del Norte: near Pamplona, alt. ca. 2000 m., *N. Funck & L.-J. Schlim 1454* (ISOTYPE, Ch; photo, AA, Ch), June 1847 (flowers white, in February). — Sierra de Ocana, forest at summit, alt. ca. 2000 m., *H. H. Smith 2510* (Ch, G, Mo, NY, US), Aug. 25, 1898 (tree 25–30 ft.).

BOLIVIA: Tumupasa, alt. ca. 1000 m., *R. S. Williams 411* (NY, US), Jan. 4, 1902 (tree 20 ft. high with white flowers turning pink). — Hacienda Simaco sobre el camino a Tipuani, alt. ca. 1400 m., *O. Buchtien 5463* (US). — Dept. La Paz, Prov. Larecaja, Copacabana (about 10 km. south of Mapiri), alt. 850–950 m., *B. A. Krukoff 11064* (AA, Ch, Mo, NY), Oct.-Nov. 1939 (tree ca. 30 m. high). — Yungas, alt. ca. 2000 m., *H. H. Rusby 627* (NY).

PERU or BOLIVIA: exact locality uncertain, *H. A. Weddell s. n.* (TYPE of *L. quinoderma*, fragm. & photo, Ch).

The characters which distinguish this species are: (1) obovate, symmetrical leaves (to 10 × 4 cm.), obtuse or nearly so at the apex, denticulate along the margin on both sides; (2) dense tawny pubescence on the external surface of the corolla and calyx, ovary and fruit, pedicel, under surface of the leaves, and young branchlets; and (3) short (0.5–1 cm. long) pedicel, often recurved.

The extent and the density of the pubescence varies in the specimens cited above. *Funck & Schlim 1454* and *Krukoff 11064* possess the densest and most typical pubescence, which extends down the branchlets. In some specimens a tendency toward glabrescence exists, but these latter are also less pubescent when very young. Most leaves show striking striae of pubescence running nearly parallel to the midrib, caused probably by the original folds in the leaves.

Here also belongs *L. quinoderma* Weddell, so obscurely described in a footnote in Hist. Nat. Quinquinas. Early in this study I planned to distinguish this entity from *L. pubescens*. However, in preparing the key to the species, I could find no characters sufficiently definite to warrant a separation of the two.

8a. **Laplacea pubescens** var. **subcaudata**, var. nov.

A specie differt foliis longioribus, 10–15 cm. longis, ca. 4 cm. latis, apice subcaudatis, juventute dense sericeis, maturitate plus minusve glabrescentibus.

PERU: Pampayacu, *E. Poeppig 1597* (fragm. & photo, Ch). — Precise locality unknown, *L. H. Ruiz s. n.* (TYPE, Ch). — Locality unknown, *L. C. Ruiz s. n.* (Ch, photo no. 9750).

BOLIVIA: Yungas, *A. M. Bang 385* (Ch, Mo, NY, US) in 1890.

The type of this variety was identified by Melchior as "*L. quinoderma*" (*L. pubescens*), and it is with that entity that it should be associated. However, the species is characterized by smaller leaves quite obtuse at the apex, with only an occasional blunt acumen. In the present new variety the apex of the leaf is characterized by an elongated acumen which gives it an appearance quite distinct from that of *L. pubescens* itself. However, I do not consider it worthy of specific distinction.

8b. **Laplacea pubescens** var. **camelliaefolia** (Triana & Planchon), comb. nov.

Laplacea camelliaefolia Triana & Planchon in Ann. Sci. Nat. sér. 4, **18**: 270. 1862. — Walpers, Ann. Bot. **7**: 367. 1868. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 136. 1925.

Laplacea cameniaefolia Hooker & Jackson, Index Kew. **2**: 30. 1894, *sphalm.*

Wikstroemia camelliaefolia (Triana & Planchon) Blake in Contrib. Gray Herb. n. s. **53**: 39. 1918.

COLOMBIA: Dept. Santander del Norte: road from Pamplona to Toledo, crossing the divide between Río La Teja (Maracaibo drainage) and Río Mesme (Orinoco drainage), thickets along stream, alt. 2500–2800 m., *E. P. Killip & A. C. Smith 19822* (AA, Ch, G, NY, US), Feb. 28, 1927 (tree 10–12 ft.; petals white).

VENEZUELA: Tachira: between Paraguita and Tabor, along Río Tachira, along Colombian-Venezuelan boundary, alt. 1820–1980 m., *J. A. Steyermark 57151* (AA, Ch), July 12, 1944 (small tree 25 ft. high; petals whitish). — Between Villapaez and Betania, along Río Tachira, near Colombian-Venezuelan boundary, alt. 2130–2285 m., *J. A. Steyermark 57163* (AA, Ch), July 12, 1944 (tree 30 ft. high; petals white). — Woods above Betania

below Páramo de Tamá, alt. 2530 m., *J. A. Steyermark 57436* (AA, Ch), July 17, 1944 (tree 40 ft. high; petals white).

This variety is separated from the species mostly on the degree of pubescence. When comparing the material cited above with the type of the species one may readily see why Triana & Planchon designated them as two species at the time. The type of the species is much more densely pubescent. Also the leaves on the variety show a tendency toward an acuminate apex, perhaps to a more marked degree than material of the species.

This variety seems to have been collected at higher altitudes than the species, generally ranging from 2000–2500 meters. Steyermark records the vernacular name *tampacillo* for his collection numbered *57163*.

9. **Laplacea tomentosa** (Martius & Zuccarini) G. Don, Gen. Syst. 1: 569. 1831. — Walpers, Repert. Bot. Syst. 1: 372. 1842. — Wawra in Martius, Fl. Bras. **12**(1): 291. 1886. — Melchior in Nat. Pflanzenfam. ed. 2, **2**: 136. 1925.

Haemocharis tomentosa Martius & Zuccarini, Nov. Gen. et Sp. **1**: 108, *t. 67*. 1826. — Choisy in Mém. Soc. Phys. Hist. Nat. Genève **1**: 145 (Mém. Ternstr. 57). 1855. — O. Kuntze, Rev. Gen. Pl. **1**: 62. 1891. — Szyszylowicz in Nat. Pflanzenfam. III. **6**: 185. 1893.

Gordonia tomentosa (Martius & Zuccarini) Sprengel, Syst. Veg. Cur. Post **4**(2): 260. 1827.

Laplacea tomentosa var. *glabrata* Wawra in Martius, Fl. Bras. **12**(1): 291. 1896.

Wikstroemia tomentosa (Martius & Zuccarini) Blake in Contrib. Gray Herb., n. s. **53**: 41. 1918.

Wikstroemia tomentosa var. *glabrata* (Wawra) Blake in Contrib. Gray Herb. n. s. **53**: 41. 1918.

BRAZIL: Minas Geraes: Ouro-Preto, *A. Glaziou 14527* (NY). — Santa Barbara, Serra de Caraça, among rocks, *M. Barreto 7228* (Ch), April 15, 1933 (tree 8 m. high). — *P. Claussen 1520* (Ch, NY), in 1841. — *L. Riedel 2623* (G). — *C. F. Martius s. n.* (G), in 1841.

This species is characterized by thick coriaceous symmetrical leaves 6–8 cm. long and ca. 3 cm. wide, rounded to obtuse at the apex, thick-tomentose beneath with accented lines of pubescence running nearly parallel to the midrib, the margin somewhat revolute, denticulate along both sides, the veins obscure.

Closely related and from the same general locality is *L. obovata*. This latter species can be separated from *L. tomentosa* by the membranaceous or submembranaceous texture of the leaves, the glabrescent character of the pubescence, and the evidence of veins.

From the material examined, *L. tomentosa* appears to be quite localized in the state of Minas Geraes.

Wawra distinguished a variety *glabrata* which here has been included in the species. There is a tendency toward glabrescence in the mature leaves of all the material of this species.

LITTLE-KNOWN OR DOUBTFUL SPECIES

LAPLACEA RAIMONDIANA Melchior in Nat. Pflanzenfam. ed. 2, 21: 136. 1925.

This species was proposed by Melchior in his treatment of the Theaceae in the above publication. No formal description was presented, but the name was offered in the key to the South American species. From the headings of the key, one finds that *L. Raimondiana* may be characterized by somewhat coriaceous, asymmetrical, oblong leaves, more or less blunt at the apex, emarginate, pubescent underneath, the margin entire. The flowers are recorded as large. The species is from Peru, and the type is *Weberbauer 2291*. A photograph of this species is in the herbarium of the Chicago Natural History Museum.

According to my own key above, this species would fall into *L. fruticosa* var. *symplocoides* because of the asymmetrical leaves with entire margin — and it is here that I believe it belongs. However, the photograph of the type shows that nearly all the leaves were folded in pressing the specimen, thus making a definite decision on the status of this species quite impossible. Unfortunately, the type was deposited in the Berlin Herbarium, which was for the most part destroyed during the past war.

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.

THE ARNOLD ARBORETUM DURING THE FISCAL YEAR ENDED JUNE 30, 1950

Horticulture. — The collections of living trees and shrubs have been maintained in good condition in spite of dry weather during the summer of 1949. In addition to the usual pruning operations the oak collection and the rhododendrons on Hemlock Hill were thinned. The Centre Street path has been completely renovated, and the Buxus collection has been assembled in a more favorable site. More than 12 tons of commercial fertilizer were used in a program designed to promote better growth of the trees and shrubs. The soil improvement project on Peters Hill is progressing satisfactorily. Weed trees and poison ivy are perennial problems, but chemical weed control is making progress.

Doctor Wyman is making a survey of all varieties of desirable ornamental woody plants in order to make our collections as complete as possible. Approximately 350 varieties were obtained from 105 different nurserymen for purposes of trial, study and display. More than 300 plants of new varieties from the Arboretum were distributed to commercial growers who specifically requested them. Several hundred of our new apple and cherry hybrids were distributed to Friends of the Arnold Arboretum. Our propagator, Mr. Fillmore, sent 1054 species and varieties of woody plants to cooperating institutions in 13 countries. He received 890 species and varieties from various sources in 15 different countries. He propagated, by cuttings, grafts, or seeds, a total of 8,200 plants.

The photographic records, especially of rare or unusual plants, is one of the responsibilities which has been neglected in the past. New equipment and other photographic facilities have enabled Mr. Howard to add 1500 pictures to the collections during the past year. These are in addition to the Kodachrome slides made to illustrate the lectures given by Dr. Wyman.

The Case Estates permit testing of new material on a much larger scale than was possible at the Arnold Arboretum in Jamaica Plain. The test nurseries contain nearly 2000 different species or varieties of woody plants, some of them introduced directly from Europe. A Post-entry Quarantine Nursery is cared for at the Case Estates, under the observation of the U.S.D.A. Bureau of Plant Quarantine. A ground cover test plot includes 70 different kinds of woody and herbaceous ground covers. Several acres of land are used for testing hybrid poplars developed under the auspices of the Cabot Foundation. The Division of Landscape Architecture of Harvard continues its experimental laboratory on the premises.

The educational work of the Arnold Arboretum has continued with the usual number of issues of Arnoldia, our journal of popular information. The Field Class was given by Dr. Wyman, who also delivered a number of lectures in many parts of the United States, including a series at the Colonial Williamsburg Symposium.

The experimental work of the Arnold Arboretum includes extensive work on propagation by Mr. Fillmore. He has also done some work with growth suppressing chemicals in connection with propagating problems. The director has continued his work with dwarfing rootstocks and altered polarity to produce dwarf trees. The breeding program has shown the value of triploids in ornamental plants. The radiation work, done under the auspices of A.E.C., has shown that plants can be subjected to several roentgens of ionizing radiation per day for months without serious injury.

Comparative Morphology. — During the year Professor Bailey and his co-workers have completed their investigations of a number of dicotyledonous families. The most comprehensive of these is a detailed study of the Monimiaceae including a suggested revision of the family. Mister R. W. Vander Wyk presented a thesis, dealing with the comparative morphology of the Annonaceae, for the doctorate which he received in June. Doctor Swamy, with his prodigious drive and efficiency, not only completed investigations of the comparative morphology of the Santalaceae, Gomortegaceae, Calycanthaceae, Saururaceae and Chloranthaceae, but also undertook a taxonomic revision of the last family.

The Herbarium. — During the year 10,775 mounted specimens were added to the herbarium, bringing the total to 656,545 specimens. A total of 16,493 specimens were received, of which 2,115 were obtained for identification, 8,424 by exchange and 5,604 by purchase or subsidy. The greater part of these accessions represent plants of the Old World, namely 4,687 from southern and eastern Asia, and 6,748 from Malaysia, Micronesia and Polynesia. Among the accessions of particular interest may be mentioned 1,585 specimens from Japan received from Dr. H. Hara, S. Suzuki and K. Uno, 1,900 East Indian plants from the Botanic Garden of Buitenzorg, 403 Indo-Chinese plants from A. Pételot, 1,325 specimens from Bombay Presidency, India, from Father H. Santapau, 1,230 specially selected Philippine plants from Dr. E. Quisumbing, 172 duplicates of Beccari's classic Malaysian plants from the Botanical Institute, Florence, Italy, and 290 of his very beautifully prepared and critically identified Chinese plants from Dr. H. H. Smith of Uppsala.

A total of 33,487 herbarium specimens were sent out during the year. Of these 10,840 were transferred to the Gray Herbarium and 610 (all orchids) to the Ames Orchid Herbarium. Duplicates totalling 4,891 were sent in exchange to institutions in the United States, and 17,146 specimens were sent to foreign institutions.

From 24 different institutions the Arboretum had 33 requests for the loan of its herbarium material. Specimens involved numbered 2,924, of which 1,841 went to thirteen American institutions and 1,083 to eleven foreign. For the use of our staff in research, 34 lots of herbarium specimens were borrowed for study. These consist of 941 specimens borrowed from five American, and 1,131 specimens from nine foreign herbaria.

Doctor Merrill had as his major project the identification of recent collections made in the Philippines. Doctor Johnston, having decided to